Can we control the impact of the weather on sales?

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The weather has a large influence on what we buy, when, and where. With climate change, this influence means that sales of consumer products vary wildly, even within seasons.

For a good many products, demand is directly or indirectly dependent on weather conditions, which can lead to surplus stock or conversely to shortages or lost sales. Although we have known about this cause and effect relationship for a long time, managers still struggle with how to make use of it and how to take advantage of the vagaries of the weather. Even if we know what T-shirt and beer sales are going to be like in the summer, it is more difficult to assess the potential impact of a cloudy or cool day on their sales. Eighty percent of French economic sectors are said to be "weather-sensitive", i.e. affected by changes in the weather. The summer of 2010, for example, was disastrous for the Russian wheat harvest, which resulted in a sharp increase in the price of cereals. But weather-related risk is not limited to dramatic events. Unless firms belong to the energy and agricultural sectors, they are generally unaware of their weather sensitivity. In fact, sales are affected by all fluctuations away from normal weather.

It therefore seems sensible from both a scientific and a managerial viewpoint to make good use of the connection between sales and unseasonal weather conditions. The impact of weather anomalies on sales thus needs to be assessed. As the world's temperate regions suffer from increasingly wider swings in the weather, the consequences on sales are also getting more and more marked. In France, the average spring temperatures vary, depending on the month, between 6 and 14°C. According to a study published in The European Journal of Operational Research in January 2015, when it is 1°C warmer in spring, there is a 3% increase in sales of children's clothes and a 2.5% increase in supermarket clothes sales. In autumn, the opposite applies: when temperature is up by 1°C, there is a 3% drop in sales of children's clothes and a 2% drop in supermarket clothes sales.

However, not all product categories react to the weather in the same way and are not sensitive to the same weather vari-

ables. Merely reading a thermometer will hardly suffice to assess sales levels! Other factors also need to be taken into consideration, such as the number of public holidays and special offers. A study conducted on sunscreen sales shows that the rate of correlation between the number of sales and the number of sunny days is 83%, but this increases to 92% when special offers and public holidays are included. Then again, for sales of certain parts of diesel engines that are sensitive to cold spells, the pivotal variable will be the number of days in the month when the minimum temperature drops below a given threshold. Lastly, we also need to consider the time lag between weather conditions and sales.

Even if the connection between weather variables and sales has been established, a manager will still be hard put to make the most of this in practical terms. Given that, even today, weather forecasts extend reliably to only ten days, only certain specific economic sectors that can adjust their operations and marketing during those 10 days are capable of making full use of this correlation. For all the other sectors, other techniques have to be implemented.

We briefly outline two of these.

In the first example, we are not using weather data for the purpose of planning ahead but rather to explain what has happened in the past. Past sales, which have already been seasonally adjusted, can also be adjusted for the effects of abnormal weather. It is then possible to work with data that are a strict reflection of the consequences of human activity: new product launches, effects of

marketing campaigns, impact of better after-sales service or of changing distributors, and so on. Financial analysts would have a much better understanding of reports from weather-sensitive companies if the data presented had been adjusted, or if they had the means to adjust the statistics themselves.

In the second example, the technique is to hedge the weather risk. Just as there are insurance products that offer protection against infrequent but catastrophic events, it is also possible to get protection against a bad season. Once the weather variable with the strongest correlation to the sales of a given product or service has been identified, it becomes possible to create an appropriate insurance product. If the identified variable has reached or exceeded the level stipulated in the insurance contract, the insurance payment compensating the loss incurred is triggered. Let us take the example of a company that makes sunscreen products. Once the season is over, if there have been fewer sunny days than the number stipulated in the contract (and therefore presumably sales are lower than expected), this triggers a compensation proportional to the missing sunny days. The compensation should cover lost profit which will be the case if there is a strong correlation. The consequences of

human activity (such as increased competition or the number of days off) are not taken into account. If the weather has been very sunny, the only cost to the sunscreen manufacturer will be the insurance premium.

There is nothing new about weather risk to human activity. However, before insurers could offer weather protection to companies, a data base of historical trends of adequate length and detail on the weather needed to be collected. In the nineteenth century, it was not until life expectancy actuarial tables came into being that life insurance could be offered. Increased competition, which severely limits a company's profit margins, justifies taking into account the weather risk. Although the necessary financial and managerial tools do exist, few executives have yet to establish the proper managerial procedures or practices. Being aware of the weather risk factor and measuring it is not enough, new managerial practices are required. For the pioneers, these are already in place. Bosch France, for example, even offer their distribu-

tors weather risk insurance. They offer a discount on all the glow plugs for diesel engines ordered if the weather wasn't cold enough during the winter season . These discounts are applied to spring orders according to temperatures observed the previous winter. In this way, Bosch subsidizes distributor inventories: if the winter is harsh, there is less risk of lost sales because distributors will already have built up their stock. Both Bosch and its distributors should achieve a bigger market share as a result, especially if winter is very cold.

Biography:

Xavier Brusset holds a PhD in Management Science from the Louvain Catholic University. He has been teaching Logistics and Supply Chain Management at the Toulouse Business School since September 2015. His research focuses on the relationship between the supply chain partners and the impact of information on their behavior. His findings have been published in academic journals such as The European Journal of Operational Research, the International Journal of Production Economics, Computers and Industrial Engineering, RAIRO Operations Research, la Revue Française de Gestion Industrielle (French Industrial Management Review)., He edited and co-authored a textbook about business cases in distribution:. Previously, Xavier also worked in financial markets and created in Argentina a web-based platform of information sharing and logistic services between shippers and carriers. Every two years, he organizes a Colloquium on European Research in Retailing (CERR).